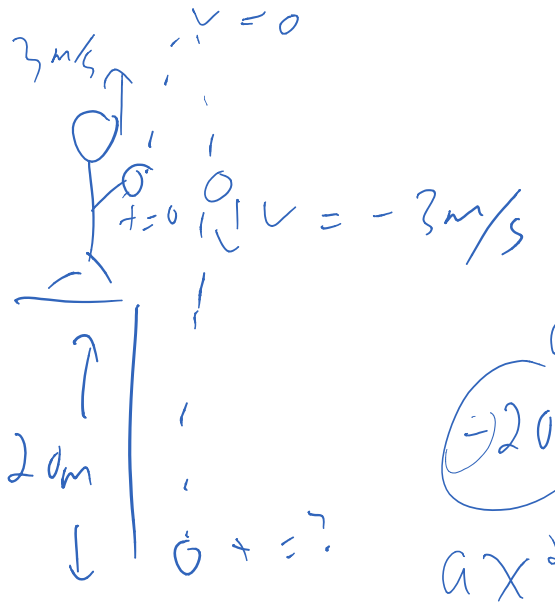
Go over kinematics problems
assign some more, study for quiz
intro to vectors and scalars
p39-40 q 33,41,43,44,46,57



$$d = \frac{1}{2}at^2 + v_i t$$

$$-20m = \frac{1}{2}(-9.8 m/s^2)t^2 + 3m/s\, t$$

$$ax^2 + bx + c = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$-4.9t^2 + 3t + 20 = 0$$

$$t = \frac{-3 \pm \sqrt{9 - 4(-4.9)20}}{2(-4.9)}$$

$$t = \frac{-3 \pm 20.02}{-9.8}$$

$$t = \frac{-23.02}{-9.80} = 2.3495\ s$$

$$= \boxed{2.35\ s}$$

f) $V_f = ?$

$V_f^2 = V_i^2 + 2ad$

$V_f^2 = (3.0\ m/s)^2 + 2(-9.8\ m/s^2)(-20.0\ m)$

$V_f^2 = 9.0\ m^2/s^2 + 392\ m^2/s^2$

$V_f^2 = 401\ m^2/s^2$

$V_f = \pm 20.0\ m/s$

$V_f = -20.0\ m/s$

e) $t_{up} + t_{down}$

f) $V_f^2 = V_i^2 + 2a(d+h)$

p37
Questions
1 speed - doesn't give the direction
speedometer and compass could
give velocity
3 yes - might be positive and negative
velocities cancelling out.
or net displacement can be zero,

running around a track

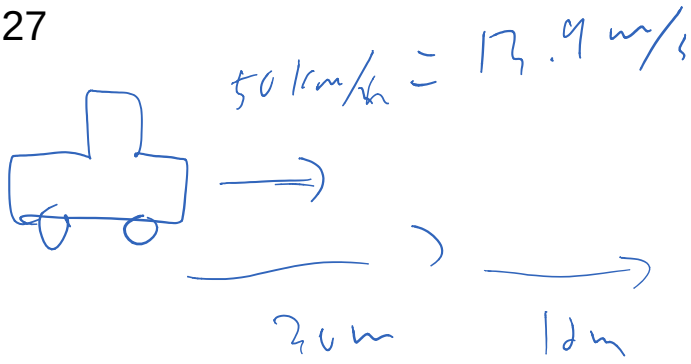
5 if velocity is constant, then both speed and direction are constant.

on the other hand, if the speed is constant, the direction can change, and therefore the velocity, and acceleration

7 yes, when you just start to fall, or when you change direction smoothly projectile thrown straight up, at the top the speed is zero while the acceleration is -9.80m/s^2

9 a=change in v/t both have the same change, 10 km/h in the same time.

q27



$a = -6.0\ m/s^2$ ← Brake

$a = \frac{70\ km/h - 50\ km/h}{7.0\ s}$ ← given

$= 0.7937\ m/s^2$

given
$d = 36\ m$
$a = 0.7937\ m/s^2$
$t = ?$
$v_i = 13.9\ m/s$

$t = 2$

$v_i = 13.9\ m/s$

$d = \frac{1}{2}at^2 + v_i t$

$30 = \frac{1}{2}(0.7937)t^2 + 13.9t$

$d = \frac{1}{2}(0.7937)(2)^2 + 13.9(2)$

$= 29.3487\ m$

$= \boxed{29\ m}$ Nope ticket or accident

Brakes

$a = -6\ m/s^2$

$v_f = 0$

$v_i = 13.9\ m/s$

$t = ?$

$v_f = v_i + at$

$0 = 13.9\ m/s + (-6\ m/s^2)t$

$t = \frac{-13.9\ m/s}{-6.0\ m/s^2}\ s$

$= 2.316\ s$

$v_f^2 = v_i^2 + 2ad$

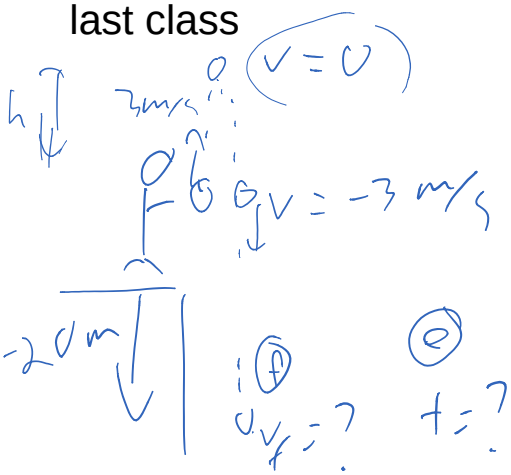
$0 = (13.9)^2 + 2(6)d$

$$d = \frac{17.9^2}{12}$$

$$\boxed{d = 15\ m}$$

length of room for brake

2-3
last class



e) $v_i = 0$

$a = -9.80\ m/s^2$

$d = 20m + h$

$d = \frac{1}{2}at^2$

$t = ?$ (down)

$t_{down} = \sqrt{\frac{2(20.41)}{9.4}} = 2.0434\ s$

$+ t_{up} =$

$v_f = v_i + at$

$t = \frac{0-3}{-9.4} = 0.3061\ s$

$t = 2.0434 + 0.3061$

$= \boxed{2.355}$

$d = -20m \quad t = ?$

$a = -9.80\ m/s^2 \quad v_i = 3.0\ m/s$

$d = \frac{1}{2}at^2 + v_i t$

$-20 = \frac{1}{2}(-9.8)t^2 + 3t$

$ax^2 + bx + c = 0 \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$-4.9t^2 + 3t + 20 = 0$

$t = \frac{-3 \pm \sqrt{9 - 4(-4.9)(20)}}{2(-4.9)}$

$t = \frac{-3 \pm \sqrt{401}}{-9.8}$ $\quad \frac{-3 \pm 20.02}{-9.80}$

t = 2.35 s

3.6

f) $v_f^2 = v_i^2 + 2ad$

v_f = +/- root of 401 m^2/s^2

v_f = - 20.0 m/s

p37
question 1
speed, no direction
velocity use the speedometer and a compass

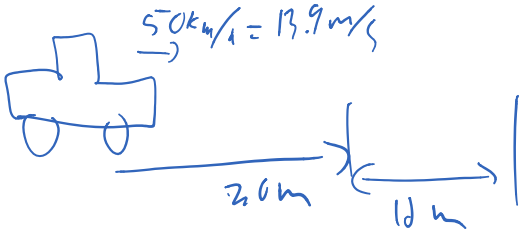
Q3 average velocity = 0 if instantaneous v = not 0?
If you change direction, the velocity can be negative and positive and cancel out.
or d=0 if you return to the same point (go around the track)

Q5 No, velocity is speed with direction so if the velocity is constant the speed is constant.
The components of velocity could be constant while the speed changes.
But if the speed is constant the velocity can change because the direction changes.

Q7 Yes, you throw an object straight up, the velocity at the top is zero while the acceleration is -9.80m/s^2.

g = gravitational field strength
= 9.80 N/kg

Q9 a= change in v/t = 90-80=
10
=10-0=10
they have the same
acceleration



$t = 2.0\,s$

Brakes $a = -6.0\ m/s^2$

guns $\frac{v_f - v_i}{t} = 0.79\ m/s^2$

$d = \frac{1}{2}at^2 + v_i t$

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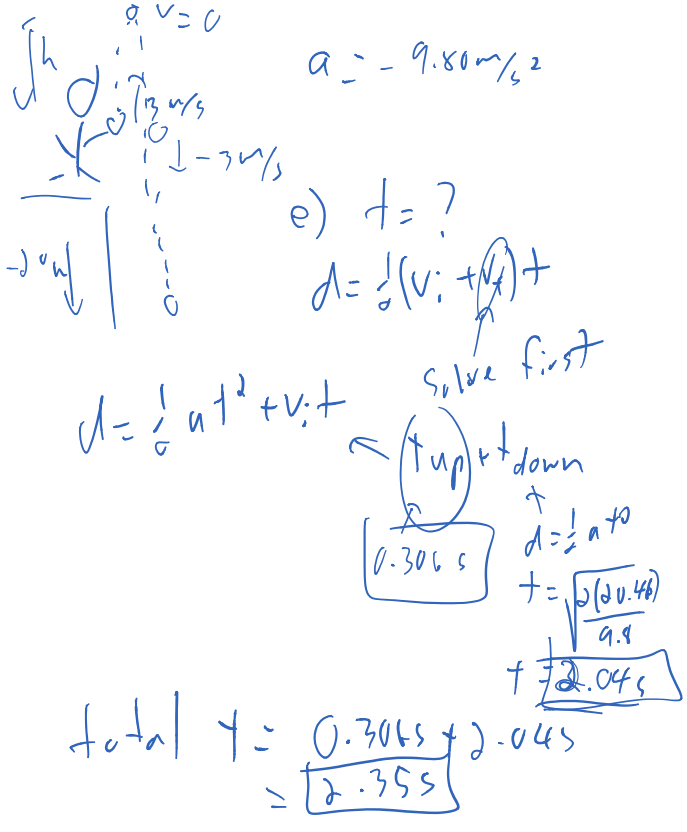

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$t = \frac{-3 \pm \sqrt{9 - 4(-4.9)20}}{2(-4.9)}$

$t = \frac{-3 \pm \sqrt{401}}{-9.4} = \frac{-3 \pm 20.01}{-9.4}$

$\frac{-23.01}{-9.80} = \boxed{2.35\,s}$

f) $v_f^2 = v_i^2 + 2ad$

$v_f^2 = 0 + 2(9.8)(-20.4)$

$v_f^2 = 9 + 2(-9.8)(-20)$

$\boxed{v_f = -20.0\,m/s}$

$t = \frac{d}{\frac{1}{2}(v_i + v_f)} = \frac{-20}{\frac{1}{2}(3 - 20.0)}$

$t = \frac{-20}{\frac{1}{2}(-17)} = \boxed{2.35\,s}$

p37
question 1
speed is a scalar - no direction
velocity is a vector
speedometer only gives speed
speedometer and a compass
you would have velocity

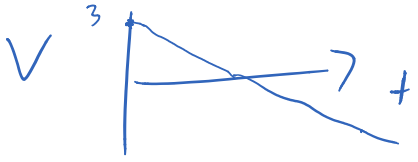
question 3

yes, if you end where you began, the displacement is zero so the average velocity is zero even though the instantaneous velocity at any point is non-zero

Q 5 No, because velocity is speed with direction, so if velocity is constant, the speed and direction are constant, so the speed is constant.

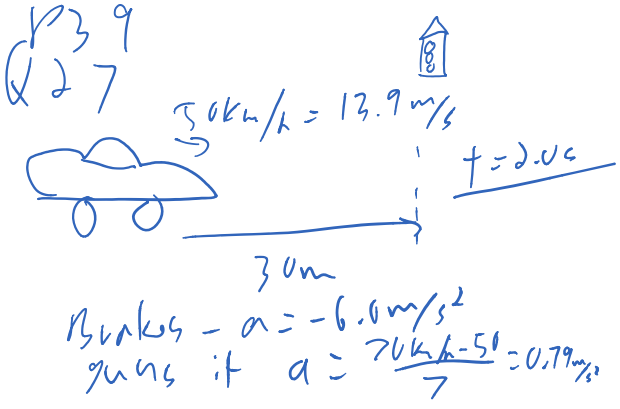
can the speed be constant with a changing velocity?
yes- if the direction is changing
- uniform circular motion

Q7 yes, if you throw an erasure straight up, at the top point the velocity is zero while the acceleration is -9.80m/s^2.



q9 a = change in velocity/time

same change in v (10 km/h) and the same time, the acceleration would be the same



$d=vit + 1/2\ at^2$
time to stop = (vf-vi)/a
= -13.9/-6 = 2.3167 s
d = 13.9(2.3167) + 1/2 (-6) $(2.3167)^2$ = 16.1 m - lots of room
d = 13.9m/s (2s) + 1/2 $(0.79m/s^2)(2s)^2$ = 29.4m she doesn't enter the intersection before the light turns red.
ticket or accident